QUICK REFERENCE CHART

The information below can help you solve some of those simple but hair-pulling problems that frustrate even the best of us. We hope you find it helpful.

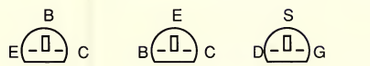
Helpful hints on laying out printed circuit boards for automatic insertion and wave soldering.

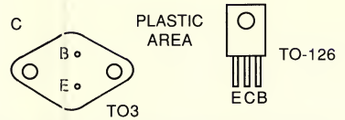
- Arrange all polarized components the one way
- All axial components of a similar package to be same leg spacing. e.g. 1/4 watt resistors—0.5"
- Put more copper on the bottom than the top of the board
- Provide test points for key voltages
- When laying out silk screen component legend, use the following references:

Component labels

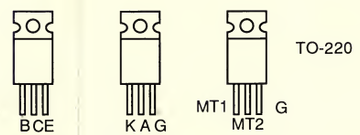
Capacitor	C
Connector	J or P
Crystal	Y
Diode	CR
Inductor	L
Integrated Circuit	IC, A or U
Lamp, Light	DS
Meter	M
Relay	K
Resistor	R
Switch	S
Terminal Board	TB
Terminals	E
Test Point	TP
Transformer	T
Transistor	Q
Vacuum Tube	V
Voltage Rectifier	VR or CR

SEMICONDUCTOR OUTLINES

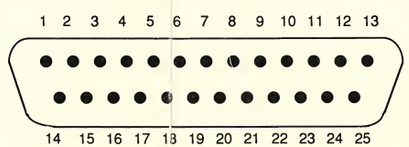


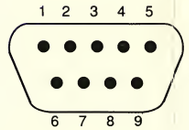


T0-3 AND TO-92 VIEWED FROM UNDERSIDE.



RS 232-C (V.24) SERIAL INTERFACE





Connectors show rear view

DB 9 PIN	SIGNAL
1	Protective Ground
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detect
20	Data Terminal Ready

9 PIN to 25 PIN RS 232 CONVERSION

DB9	1	2	3	4	5	6	7	8	9
DB25	8	3	2	20	7	6	4	5	22

CAPACITOR MARKINGS

Polarised (look for +)

	10,000µ		
	1,000µ		1,000
107	100µ		100
476	47µ		47
226	22µ		22
106	10µ		10
475	4µ7	4.7	4.7

May be unpolarised

	225	2µ2	2.2	2.2
	105	1µ0	1.0	1
470N	474	0µ47	0.47	.47
220N	224	0µ22	0.22	.22
100N	104	0µ1	0.1	.1

Not polarised

47N	473		0.047	.047
22N	223		0.022	.022
10N	103		0.01	.01
4N7	472	4700P	.0047	
2N2	222	2200P	.0022	
1N0	102	1000P	.001	
N47	471	470P		
N22	221	220P		
N10	101	100P		
	470	47P		
	220	22P		
	100	10P		

Tolerances

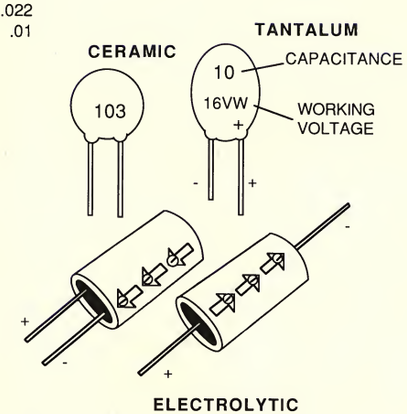
J = ±5%
K = ±10%
M = ±20%

There may be other values in between for example:

10N	18N	22N	27N	33N	47N
.1	.12	.15	.39	.47	.68	1.0

SI UNITS

10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	µ
10^{-9}	nano	n
10^{-12}	pico	p



CAPACITOR TYPES

Aluminium Electrolytic
- Filtering and smoothing rectified A.C. e.g. Power Supplies
- Bypassing and coupling in audio applications
- Timing for non-critical circuits

Solid Tantalum
- Low leakage, high reliability, long life, small size

Ceramic
- Low cost, high capacitance, small, two types:
  For high tolerance and stability in RF tuned circuits
  Bypass capacitors for power spike suppression and filtering

Paper
- For power factor correction— in lighting and electric motors

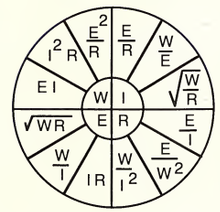
Polyester --Greencaps
- General purpose, lowest cost

Polycarbonate
- Low temperature coefficient
- Lower dielectric losses

Polystyrene
- High tolerance, high stability— with ferrite coils makes stable tuned circuits &oscillators

Polypropylene
- Very low dielectric losses
- Suitable for high power inverters, converters and T.V. deflection

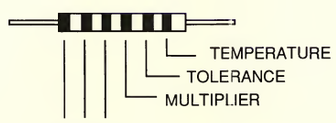
OHMS LAW



W = POWER IN WATTS
E = EMF IN VOLTS
I = CURRENT IN AMPS
R = RESISTANCE IN OHMS

RESISTOR COLOUR CODES

The figure below shows the layout for resistors displaying six colour bands. For five band resistors, the temperature coefficient is not shown. For four colour bands, one significant figure is also omitted. For three colour bands, the tolerance and one significant figure are omitted.



MULTIPLIER	TOLERANCE	TEMPERATURE COEFFICIENT	COLOUR
0		200 ppm	BLACK
1	1%	100 ppm	BROWN
2	2%	50 ppm	RED
3		15 ppm	ORANGE
4		25 ppm	YELLOW
5	5%	5 ppm	GREEN
6			BLUE
7	0.25%		VIOLET
8	0.1%	10 ppm	GREY
9	0.05%		WHITE
10^{-1}	5%		GOLD
10^{-2}	10%		SILVER

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For technical assistance and advice, please contact our Applications Engineer